

Extreme Temperature Stitched Structures, Phase I

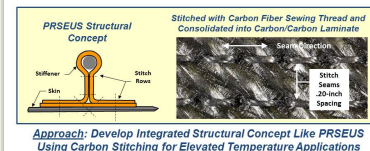
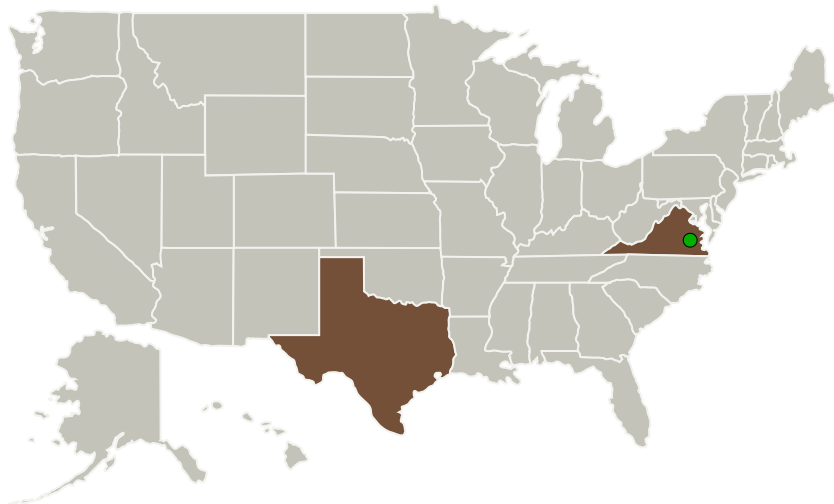
Completed Technology Project (2016 - 2016)



Project Introduction

The innovation proposed here is the development of an integrally stiffened stitched composite structure that is capable of operating within extreme thermal environments similar to those encountered by atmospheric reentry vehicles. Such temperature extremes and challenging structural weight goals will necessitate the use of advanced composite material systems that can also be assimilated into structurally efficient hot structure architectures that are damage tolerant, lightweight, and reasonably affordable to manufacture. While such goals have been achieved within subsonic design regimes using the Pultruded Rod Stitched Efficient Unitized Structure (PRSEUS), the lack of elevated temperature capable materials has precluded its application at higher temperatures. Recognizing the potential that this novel structural design approach might hold at higher temperatures, coupled with the recent advances made in carbon fiber sewing threads, further experimentation is warranted to determine whether the advantages demonstrated using integral stitched structures could also be extended to high speed airframe applications.

Primary U.S. Work Locations and Key Partners



Approach: Develop Integrated Structural Concept Like PRSEUS Using Carbon Stitching for Elevated Temperature Applications

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Organizations Performing Work	Role	Type	Location
Carbon-Carbon Advanced Technologies, Inc.	Lead Organization	Industry	Kennedale, Texas
● Langley Research Center(LaRC)	Supporting Organization	NASA Center	Hampton, Virginia

Primary U.S. Work Locations	
Texas	Virginia

Project Transitions

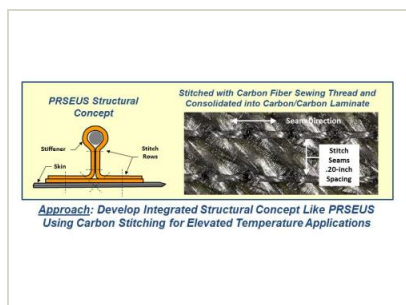
▶ **June 2016:** Project Start

✓ **December 2016:** Closed out

Closeout Documentation:

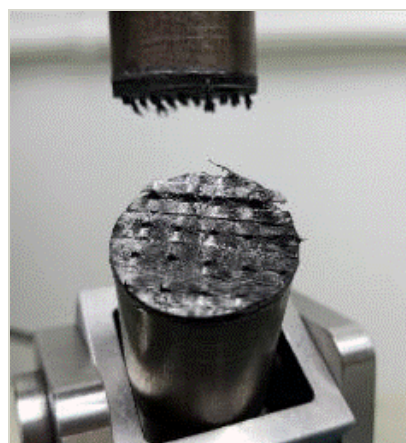
- Final Summary Chart(<https://techport.nasa.gov/file/140285>)

Images

**Briefing Chart Image**

Extreme Temperature Stitched Structures, Phase I

(<https://techport.nasa.gov/image/137067>)

**Final Summary Chart Image**

Extreme Temperature Stitched Structures, Phase I Project Image
(<https://techport.nasa.gov/image/135918>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Carbon-Carbon Advanced Technologies, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

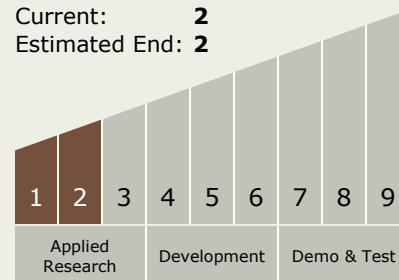
Carlos Torrez

Principal Investigator:

Aaron Brown

Technology Maturity (TRL)

Start: **1**
Current: **2**
Estimated End: **2**



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Technology Areas

Primary:

- TX12 Materials, Structures, Mechanical Systems, and Manufacturing
 - └ TX12.1 Materials
 - └ TX12.1.1 Lightweight Structural Materials

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System